

PATENT APPLICATION

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re the application of:

Attorney Docket No.: 45545.18.0

HAN, et al

Application No.: 10/724,484

Examiner: Hoang, Tu Ba

Filed: November 28, 2003

Group Art Unit: 2832

For: THERMISTOR HAVING SYMMETRICAL STRUCTURE

---

AMENDMENT

MAIL STOP AMENDMENT  
Commissioner for Patents  
P.O. Box 1450  
Alexandria, VA 22313-1450

Sir:

In response to the Office Action of April 21, 2006, and in accordance with the automatic extension of time for response provided by 37 C.F.R. § 1.136(a), amendment to the above-identified patent application is requested.

An Amendment to the **Drawings** is described on **page 2**.

Amendments to the **Claims** begin on **page 3**.

**Remarks** begin on **page 7**.

Amendment to the Drawing Figures

Please substitute the enclosed replacement drawing marked "Replacement Sheet" for

Figure 1.

In the Claims

Please substitute the following amended claims for those currently pending:

1. (Currently amended) A thermistor comprising:

a resistance element having upper and lower surfaces and showing a resistance varying characteristics according to the change of temperature;

first and second conductive layers formed on the upper surface of the resistance element, the first and second conductive layers being adjacently engaged to each other with a non-conductive gap interposed therebetween;

first and second electrodes formed on the lower surface of the resistance element and electrically separated from each other;

a first connector conductively electrically connecting the first conductive layer to the first electrode; and

a second connector conductively electrically connecting the second conductive layer to the second electrode,

wherein the first and second conductive layers and the first and second electrodes are arranged so that the first conductive layer and the second electrode face each other and substantially overlap each other with the resistance element interposed therebetween, and the second conductive layer and the first electrode face each other and substantially overlap each other with the resistance element interposed therebetween, and the non-conductive gap has a shape of concave-convex patterns,

wherein the first conductive layer and the first electrode have the same polarity, the second conductive layer and the second electrode have the same polarity, the first conductive layer and the second conductive layer have different polarities, and the first electrode and the second electrode have different polarities.

whereby a current path is formed between the adjacent first and second conductive layers via a region where the non-conductive gap of the resistance element is formed, and

wherein the non-conductive gap has a width smaller than a thickness of the resistance element.

2. (Canceled)
3. (Canceled)
4. (Canceled)
5. (Original) A thermistor according to claim 1,

wherein the resistance element is a polymer having a positive temperature coefficient.
6. (Original) A thermistor according to claim 1,

wherein the first and second conductive layers are made of copper or copper alloy.
7. (Original) A thermistor according to claim 1,

wherein the first and second electrodes are made of copper or copper alloy.
8. (Original) A thermistor according to claim 1,

wherein the first connector electrically connects the first conductive layer to the first electrode via one side of the resistance element, while the second connector electrically connects the second conductive layer to the second electrode via the other side of the resistance element.
9. (Original) A thermistor according to claim 1,

wherein the resistance element has through holes at both sides,

wherein the first connector electrically connects the first conductive layer to the first electrode through the through hole at one side of the resistance element, while the second

connector electrically connects the second conductive layer to the second electrode through the through hole at the other side of the resistance element.

10. (Previously presented) A thermistor according to claim 1,  
wherein the shapes of the non-conductive gap is rectangular, triangular, zigzag or waved.

11. (Previously presented) A thermistor according to claim 1,  
wherein the first and second electrodes are adjacently engaged to each other with a non-conductive gap interposed therebetween.

12. (Previously presented) A thermistor according to claim 1,  
wherein, when voltages having opposite polarities are applied to the first electrode and the second electrode,

a current path is formed between the adjacent first and second conductive layers via a region where the non-conductive gap of the resistance element is formed;

a current path is formed between the adjacent first and second electrodes via a region where the non-conductive gap of the resistance element is formed;

a current path is formed between the first conductive layer and the second electrode via the resistance element disposed therebetween; and

a current path is formed between the first electrode and the second conductive layer via the resistance element disposed therebetween.

13. (Previously presented) A thermistor according to claim 12,  
wherein, when voltages having opposite polarities are applied to the first electrode and the second electrode,  
a current path is formed between a portion of the first connector disposed adjacent the second side of the resistance element and the second conductive layer via a region where the non-conductive gap of the resistance element is formed; and

a current path is formed between a portion of the second connector disposed adjacent the first side of the resistance element and the first conductive layer via a region where the non-conductive gap of the resistance element is formed.

14. (Canceled)

REMARKS

Claims 1, and 5-13 are pending. By this Amendment, claim 1 has been amended, and claims 2 and 4 have been canceled.

Claim 1 of the present invention is defined such that a second conductive layer (or, a first conductive layer) and a second electrode (or, a first electrode) having different polarities are arranged at a position facing the first electrode (or, the second electrode) and a position adjacent thereto via the non-conductive gap, and the non-conductive gap has a width smaller than a thickness of the resistance element, thereby ensuring smooth current flow between the conductive layers (or, the electrodes) adjacent to each other.

To the contrary, Koyama disclose that electrodes having different polarities are arranged at positions facing each other, but the same polarity is arranged to positions adjacent to each other via a non-conductive gap. In addition, a width of the non-conductive gap is set greater than a thickness of a resistance element, which resultantly intercepts a flow of current through the non-conductive gap (see [0056] of column 4).

Thus, Koyama is completely different from Claim 1 of this application in aspect of technical configuration.

Also contrary to Claim 1, Huang et al. shows the following current flow: “the first portion (12A) of the first conductive electrode → the first portion (11A) of the second conductive electrode and the second portion (11B) of the second conductive electrode → the second portion (12B) of the first conductive electrode” (see[0032] of Column 4 and FIG. 1).

As mentioned above, Huang et al. also do not give any teaching or suggestion in relation to a current flow between electrodes adjacent to each other. It is also presumed from the fact that Huang et al. set a width of an isolation trench greater than a thickness of the resistance element.

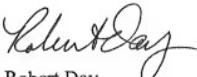
Thus, Huang et al. is completely different from Claim 1 of this application in aspect of the technical configuration.

Claims 5-13 all depend from claim 1, either directly or indirectly, and are therefore also believed to be patentable for at least the reasons provided above for claim 1.

In view of the foregoing, it is submitted that this application is in condition for allowance. Favorable consideration and prompt allowance of the application are respectfully requested.

The Examiner is invited to telephone the undersigned if the Examiner believes it would be useful to advance prosecution.

Respectfully submitted,



Robert Day  
Registration No. 54,059

**Customer No. 22859**

Fredrikson & Byron, P.A.  
200 South Sixth Street, Suite 4000  
Minneapolis, MN 55402-1425 USA  
Telephone: (612) 492-7000  
Facsimile: (612) 492-7077

*Please grant any extension of time necessary for entry; charge any fee due to Deposit Account No. 06-1910.*